

REMARKS

Claims 1, 9 and 10 have been rejected by the Examiner under 35 USC 102(b) as being anticipated by Haslsam et al., U.S. Patent 4,192,095. Claims 2-6 have been rejected by the Examiner under 35 USC 103(a) as being unpatentable over Haslsam et al. in view of Ahlnas et al., U.S. Patent 5,482,529. Claims 7 and 8 have been rejected by the Examiner under 35 USC 103(a) as being unpatentable over Haslsam in view of Dannelly, U.S. Patent 4,245,432. These rejections are respectfully traversed.

The present invention relates to a fertilizer composition for coating plant seeds comprising an oil/water emulsion or oil/water emulsion suspension and nutrient salts disclosed in the aqueous phase thereof. The present invention is also directed to plant seeds coated with the fertilizer composition. The present invention is based upon the surprising finding that it is possible to combine plant nutrients with a fixing agent and provide a single homogenous coating composition which can be applied to the surface of plant seeds. The coating composition was found to be excellent in terms of preservability, durability and handling of the coated seed material as well as providing excellent early growth properties. The various components and parameters used in the coating composition of the present invention have been found to have specific influences on the properties of the coated seed. Thus, the preferable selections of compounds and their specific weight amounts as well as controlling the pH, influence the stability of the coated seeds in terms of caking, flowability, detachment of the coating layer from the surface of the seeds, dust formation, and the like, which must be balanced with the vitality required for the seeds (please see in this regard pages 6 and 7 of the present application).

The amount and ratio of the oil and water is important in order to provide a homogenous composition and not to separate one of the components from the mixture. The amount of water influences the drying characteristics and thus the mechanical properties, such as cracking and abrasion. Only a limited amount of water should be added to the seed without the need of further drying in order not to incur premature germination.

The pH is adjusted within a preferred range to avoid damage to the sprout and to avoid a decrease in germination. The typically used water-soluble salts such as monopotassium phosphate or monoammonium phosphate have a natural pH of around 4 or 4.5, which is too acidic for direct contact with the seed surface. Therefore, the adjustment of the pH within the range of 5 to 7 is important in achieving the results of the present invention.

An excess of sugar utilized in the seed coating composition of the present invention causes stickiness and results in increased caking whereas, on the other hand, the proper amount is beneficial for the adherence of the coating to the seed surface.

In the present invention, plant nutrient is an essential feature as it provides the seed the nutrition necessary during germination and early stage development. Thus, the present invention is based upon the surprising finding that it was possible to combine the plant nutrient with a fixing agent and provide a single homogeneous coating composition which, in one step, is applied to the surface of the seeds.

The Rejection Under 35 USC 102(b)

The Haslam '095 reference is relied upon by the Examiner to show a coated plant seed which is coated with a water and oil coating composition in the form of an emulsion or an emulsion suspension, in which the coating composition comprises a mixture of a plant nutrient (urea) and a fixing agent (water and oil). However, a thorough reading of the Haslam reference will clearly show that the prior art patent is not even remotely related to the present invention with respect to inventive concept, problem to be solved and coating composition utilized for the plant seed. More specifically, the Haslam patent is directed to problems associated with the planting of rice in rice fields. Thus, because of the normal weight and size of rice seed, rice tends to float in water. This tendency to float results in inaccurate planting and substantial variations in the resulting patterns of plant growth. To counteract this problem, the invention of the Haslam patent is to add weight to the individual rice seeds to produce heavy seeds which will

sink when planted in water. The weight applied to the seeds is obtained by the production of a suspension containing an inert water-insoluble inorganic particulate material having a substantial density in comparison to water or seeds. Suitable examples of the water insoluble inorganic particulate material includes such materials as pyrite, silica sands, flue dust, iron blast, zinc ores, and the like. The water insoluble inorganic particulate material advantageously has a density of 2.7 grams per cubic centimeter or higher. The suspension can include urea, sugar or other weighting agents soluble in water to increase the specific gravity of the water phase of the rice coating composition. As noted in column 2, lines 2-4 of the Haslam patent, the addition of a plant nutrient such as urea is not an essential feature of the teachings of the Haslam patent and as such, can be entirely eliminated. Thus, the function of the urea is only to assist in surface treatment to facilitate the stabilizing of the essential component in the composition of the Haslam patent, that is, the inert, solid, water insoluble inorganic particulate material. Thus, the problem solved by the Haslam patent in providing heavy seeds does not require the presence of a plant nutrient and, as such, does not contemplate the Applicants' inventive contribution of providing a plant seed with the homogenous coating of a plant nutrient which provides the seed nutrition necessary during germination and early stage development.

Furthermore, one skilled in the art would certainly not consider the addition of urea to provide any nutrition effect, especially when it is recognized that the specific examples are directed to aqueous rice cultivation where water soluble nutrients attach to seed would dissolve from the vicinity of the seed before any possible nutritional effect would take place. Furthermore, the amount of urea used, if any, can be determined from Examples 1-3 of the Haslam patent. Thus, based upon the weight amounts disclosed, it can be calculated that the urea content of the coating compositions are far less than 10%, which is, in turn far below the 40 to 70% nutrient content defined by the present invention. For example, calculations based on the amounts described in Example 1 shows that if there is 133.4 g of water, 65.8 g urea, 29.9 g emulsifier, 158.3 g oil and 993.6 g pyrite, a suspension is formed which contains 4.8 weight percent urea from a suspension weight of 1,381 g. This suspension is further mixed with 2 parts of water before being applied to the seeds. Thus, only 1.6 wt. % of urea is present in the final coating composition. Still further, in Col. 1, line 46 of the Haslam patent, it is stated that urea is

added to a water phase. The amount of urea thus obtained in the coating composition is restricted by the temperature (below 30°C) the seed can tolerate in order not to decrease the germination property. The solubility of urea at 30°C is about 50%, and taking into account the added amount of inorganic particulate, oil and dilution of the suspension with water, this adds up to a urea content of theoretically less than 10%, as well.

Clearly, the Haslam patent does not contemplate and, as such does not anticipate the invention as defined by the claims of the present application.

Rejection Under 35 USC 103

The Examiner, recognizing the deficiencies in the Haslam patent has further relied upon the Ahlnas '529 in an attempt to reject the claims of the present application. In paragraph 7 of the Examiner's Office Action letter, the Examiner recognizes that the Haslam patent does not disclose the use of a surface-active agent, a pH regulating agent, and the specific percentages of each ingredient utilized in the composition. Thus, the Examiner turns to the Ahlnas patent to disclose a fertilizing preparation which is utilized for improving the extraction of phosphorus for plants. However, a major defect of the Ahlnas patent is the fact that there is no recognition in the prior art reference that the fertilizing preparation disclosed therein can be applied to plant seeds. The present invention, as discussed hereinabove, is based upon the surprising discovery that it is possible to combine a plant nutrient with a fixing agent and provide a single homogenous coating composition which is attached to the surface of the seed, that is in the immediate vicinity of the seed and which was found to possess excellent preservability, durability and handling of the coated seed material while preserving early plant growth properties. On the other hand, the Ahlmas patent is concerned with the poor ability of plants to use the phosphorous in the soil and thus provides a fertilizer which retains an acid or acid forming substance capable of improving the phosphorous assimilation of plants. Thus, the Ahlna patent discloses a controlled soluble fertilizer preparation in the form of an emulsion suspension or preferably in the form of a paste

in which the paste-like fertilizer compositions include acids such as citric acid (Example 1), a mixture of C2-C4 dicarboxylic acids (Example 2), p-toluene sulfonic acid (Example 3), m-g acetate (Example 4), ammonium proprinate (Example 5), citric, oxalic acid and formic acid (Example 6), and nitric acid (Example 7). Thus, the Ahlnas patent is directed to a fertilizing preparation which is utilized for a completely different purpose, that is, to facilitate the ability of plants to utilize a phosphorous in the soil and, as such, there is not even the remotest suggestion or consideration given to the use of such fertilizing preparations as a seed coating material as defined by the present invention. The fact that additional acid (inorganic or organic) is added to the fertilizing preparation of the Ahlnas patent makes the thus-obtained fertilizer product acidic. The acidity of the fertilizer product is high enough in order to enable the liberation of phosphor into soluble form from, for example, apatite. If such an acidic paste is in direct contact with a seed, it will deteriorate or slow down the germination process. Since the Ahlnas patent is not concerned with providing a nutrient coating composition on a seed plant, one skilled in the art certainly would not find it obvious to utilize the fertilizing preparation of the Ahlnas patent in the seed treating suspension of the Haslam patent, particularly recognizing that the Haslam patent is not concerned with providing a nutrient for the seed disclosed therein, but rather for producing heavy seeds which will sink when planted in water.

In connection with the rejection of claims 7 and 8 under 35 USC 103(a) the Examiner has further relied upon the Dannelly '432 patent to show the coating of plant seeds with a coating which is not too thick for the plant to grow. It is the Applicants' position that the further reliance upon the Dannelly patent does not strengthen the Examiner's rejection of the claims, particularly when it is recognized that claims 7 and 8 are dependent from claim 1 and thus are considered patentability distinguishable over the prior art relied upon by the Examiner for the same reasons as claim 1 is considered patentable.

As the Examiner will note, the claims have been amended to include certain advantageous features of the present invention. In order to arrive at the present invention, it would be necessary for one skilled in the art to have tested various combinations of the named components in varying amounts and then attaching a coating of these components to the surfaces

of various different seeds, testing each combination for the mechanical properties during storage, transport and sowing and still further, using several years of growth experiments for comparing the results against other possible reference coatings. With all of the above variables in mind, one skilled in the art with the references before him could not possibly arrive at the Applicants' inventive contribution without completely reconstructing the teachings of the references in view of the Applicants' own disclosure.

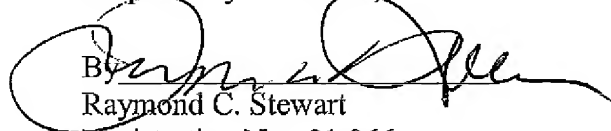
In view of the above amendments and remarks reconsideration of the rejections and allowance of all of the claims of the present application are respectfully requested.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Joseph A. Kolasch Reg. No. 22,463 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,



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